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black walnut is smaller, with a depression at the top in which the bud is placed. The butternut scar has a fringe of hairs just above it, while the black walnut is smooth in this place.

5. *The general habit of the tree.*—We are familiar with the graceful outlines of an elm, and we recognize it at a distance by its general appearance. Most other trees have habits just as characteristic, when we once learn to know them. A careful study from this point of view will yield very interesting results.

We teachers must first get the “tree feeling” ourselves, and then transfer that feeling to our students. A tree is the most successful form of plant life on the face of the earth, and we admire it for that. When we know it intimately, our admiration increases. When we realize the vast amount of work it performs in gathering in the elements from the air and soil, and in transforming them into great shafts of wood, we marvel at its power. The study of trees is not only a pleasure from an æsthetic standpoint, but it also is of importance from the educational and economic standpoints. And right here is where the teachers have a mission. The destruction of our forests and the depletion of the lumber supply are one of the most important internal economic problems that confront the country. The forests are not being destroyed because of avarice and greed, as we are often led to believe, but because of the ignorance of the life-habits and the requirements of the trees. If you teach your students to know the trees, their habits and conditions of growth, and really to appreciate them in all their aspects, you will be creating a public opinion that will not allow the destruction of the forests. This does not mean that the forests should not be cut. They should be cut; but they should be cut in such a way as not to destroy their productiveness.

WINTER HABITS OF BIRDS¹

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Of the nearly two hundred birds which may be seen during a year in a region like this about Chicago, scarcely more than fifty will remain during the winter proper. Of these fifty about twenty will

¹ Read at the conference of the Departments of Botany and Zoölogy.

be commonly seen in the places especially suited to them. Thus the study of birds in the winter season becomes greatly reduced in the number of species, and therefore more possible of definite results with each species.

The winter birds prepare for the cold by molting their whole plumage, in common with other birds, replacing the old worn feathers, which furnish covering enough for the summer, with complete feathers, and with an addition of down at the base of these feathers, and usually also, with more or less down in the normally unfeathered tracts. This new dress is more protective in color than the old, so that the birds are less readily seen by their enemies in the leafless landscape. They also become very fat as a further protection from the cold in furnishing both covering and fuel for the winter. Thus equipped, they have no fear of any degree of cold likely to be met in the regions where they choose to remain, provided the food-supply is sufficient. A few days of scanty rations, or none at all, will surely result in reduced power of resistance, or even death.

Winter birds, particularly, possess a strong instinct of mutual protection, except, of course, the birds of prey, which necessarily remain solitary, except when breeding, or sometimes when migrating. Flocking is common even among birds which never nest in communities. Flocks composed of horned larks and longspurs wander over the fields; flocks of snowflakes whirl about in front of a snowstorm; tree sparrows and juncos range the woods and adjoining fields; goldfinches wander everywhere; bob-white and the grouse feed and range in close flocks; and even the crows are likely to feed in companies.

Many birds which do not form flocks, properly speaking, do live in loose flocks of their own or several species, which might more properly be termed troops. This is particularly true of woods birds. Not infrequently the flocking woods birds will be found in these troops, the flock as a unit or scattered among the other species. The nuthatches, titmice, chickadees, and downy woodpecker, are almost invariably found together, and with them as a nucleus may often be associated hairy woodpeckers, red-bellied woodpeckers, flickers, blue jays, brown creepers, goldfinches, tree sparrows, song sparrows, juncos, cardinals, and rarely winter and Carolina wrens, making a

very respectable company. The interesting thing about these troops is that they are constantly wandering about in the woods, feeding all the time they are moving forward. Thus it may happen that one may go into the woods and fail to find any birds at all, if he happens to be outside of the range of the particular troop belonging to that piece of woods; but the birds may generally be started his way by imitating the winter call of the chickadee or tufted titmouse, and he may keep the troop about him for some time, if the imitation is continued; for in winter the birds are inquisitive creatures.

In speaking of the places where birds may be found in winter one must always qualify the statement with, "if food is obtainable." In a general way, it may be said that in severe weather birds will be found in protected places. They revel in a quiet snowstorm, but seek shelter on a clear but windy day. Hence, woods which offer the proper cover must either be thick enough to stop the wind, or else be provided with ravines and hollows of some depth. A gorge with one precipitous side and an opposite weed-grown flat would be ideal. In such places there may be troops composed of as many as fifteen species. I have already mentioned where the flocking birds and those grouping themselves into troops may be found. The hawks, owls, and shrikes, being flesh-eaters, and therefore of solitary habits, prefer deep woods or gorges, particularly in stormy weather. All are occasionally seen away from such places, of course. Blue jays, downy woodpeckers, chickadees, and nuthatches are found more or less in towns and parks, and are absent from the region immediately surrounding, but may be found in their usual numbers in the woods some distance away. Even the strictly field birds, like horned larks and longspurs, retire to the lee of woods in stormy weather. Crows will congregate where food is most abundant and most easily obtainable, which is often about slaughter-houses. If you would find the birds in winter, you must go where they live, for they are too busy making a living to come to you.

Certain of the birds will eat practically anything digestible, and some things that are not, and that is the reason why they are able to live the winter through. The true flesh-eaters, however, refuse any other food, and they are often forced to retire farther south to get it. Your winter-bird restaurant may be supplied with anything you may

have. The birds are thankful for any favors. If you fail to establish such a lunch counter, they will help themselves to your refuse barrel.

Few people seem to realize that any birds sing in winter. Tree sparrows are certain to sing, if it is stormy enough. From the way they play in the snow it is certain that they are not singing to keep their spirits up. They evidently feel the inspiration of battling with the storm. One other bird, the northern shrike, really sings. It is a question whether the so-called songs of the chickadee and tufted titmouse may not really be their flocking calls. However that may be, they answer very well for songs. Very rarely the cardinal may be coaxed to sing by an imitation of his challenge song. But during warm, spring-like days in late winter any of the winter birds may burst into song.

Closely allied to song is the play of birds; for they certainly play. The friendly chase is probably the most common form of play. Playing in the snow may be a form of bathing in the absence of water, but, if so, it takes on a form of play. What Thompson-Seton calls the chickadee's "crazy dance" is clearly play. I have seen it in late winter more often than in late autumn. The blue jay imitates the cries of hawks, while he is concealed, driving all birds in the neighborhood to cover, and then steps out on a clear branch and giggles. It is said that shrikes play with their victims when they have impaled them on thorns. I don't believe it. Even hawks have a form of aerial play during late winter. Superfluous energy coupled with favorable weather conditions might readily result in play.

One of the most interesting things about winter birds is the manner in which they pass the night. Most of the owls are nocturnal birds, and so are feeding during the night. They hide in thickets of branches or in hollows during the daylight, some of them in small companies. Hawks and shrikes find some woods cover among the thick branches well up above the ground. Birds that nest in cavities seem to prefer cavities to sleep in, but many times snuggle down in a favorable tree crotch, or they may even find a resting-place among the leaves which cling to shrubs or grape vines. I caught the first tufted titmouse I ever saw because he chose such a bed while I watched him. The woods-flocking birds seek rest in thickets more or less covered with

snow, in brush piles, in grass, or even in cavities in the rocks. I have found juncos and song sparrows, at twilight, snugly hidden in corn shocks, in hay stacks, and in barns, either burrowing in the hay or perched on timbers. Field birds pretty generally agree in sleeping under the grass when they can, under the snow when it is deep enough to furnish good cover. Every hunter is familiar with the little holes made in soft snowdrifts by prairie chickens that have gone to rest. Horned larks, snowflakes, longspurs, and even meadow larks do the same, only with less evidence, because they are smaller. One is fully repaid for his effort to tramp over the snow-covered fields in the early morning twilight by the sudden popping of a snow kernel at his feet into a startled sleepy bird, darting off a few rods, and again plunging head-foremost into the soft snow to finish his nap. Bob-white has solved the problem of the best rest coupled with the best protection. The leader first selects the bivouac, treading the ground over carefully to make sure of its suitability. He is soon joined by others who slide up, with their heads pointing the same way. Others rapidly join themselves to this nucleus, all tails touching in the center of the circle now formed. Three hungry or careless birds stand without the complete circle, but two of them manage to wriggle themselves into position. The last one tries here and there without success. But to be left out means probable death. He lightly jumps upon the backs of his mates, closely examines the whole circle, settles himself between two birds and wriggles to the ground safe.

THE SCHOOL CITY¹

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The school-city idea, as such, is probably an offshoot of the older idea of student participation in school government, which originated about the beginning of the sixteenth century in Germany, and which has found expression in various forms in the great endowed schools of England and the colleges of America, and in recent years in numbers of the lower schools of the United States and Canada.

¹ Read at the conference of the Departments of History and Political Science.